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(54) **RADIATION HARDENED THIN-FILM TRANSISTORS**

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CPC ***H01L 29/7869*** (2013.01); ***H01L 21/42*** (2013.01); ***H01L 21/477*** (2013.01); ***H01L 21/76868*** (2013.01)

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(57) **ABSTRACT**

A thin-film transistor comprises an annealed layer comprising crystalline zinc oxide. A passivation layer is adjacent to the thin-film transistor. The passivation layer has a thickness and material composition such that when a dose of radiation from a radiation source irradiates the thin-film transistor, a portion of the dose that includes an approximate maximum concentration of the dose is located within the annealed layer. The annealed layer has a thickness and threshold displacement energies after it has been annealed such that: a) a difference between a transfer characteristic value of the thin-film transistor before and after the dose is less than a first threshold; and b) a difference between a transistor output characteristic value of the thin-film before and after the dose is less than a second threshold. The thresholds are based on a desired performance of the thin-film transistor.

12 Claims, 27 Drawing Sheets